

CLAIMS

1. A power-supply apparatus for outputting from an output terminal via each of one or more switching  
5 elements, each element having a control electrode, a voltage input to an input terminal, comprising:

a voltage-generating circuit for generating an output voltage  $V_o$  proportional to a voltage between an input end and an output end of said switching element  
10 so as to output the generated voltage; and

a control circuit for controlling an operation of said switching element depending on the output voltage  $V_o$  of the voltage-generating circuit;

wherein the control circuit causes the switching  
15 element to reduce an output current when the output voltage  $V_o$  of the voltage-generating circuit exceeds a predetermined reference voltage  $V_s$ .

2. A power-supply apparatus for outputting from  
20 an output terminal via each of one or more switching elements, each element having a control electrode, a voltage input to an input terminal, comprising:

a voltage-generating circuit for generating an output voltage  $V_o$  proportional to a voltage between said  
25 input terminal and said output terminal so as to output

the generated voltage; and

a control circuit for controlling an operation of said switching element depending on the output voltage  $V_o$  of the voltage-generating circuit;

5            wherein the control circuit causes the switching element to reduce an output current when the output voltage  $V_o$  of the voltage-generating circuit exceeds a predetermined voltage  $V_s$ .

10            3. A power-supply apparatus for controlling a voltage input to an input terminal such that the voltage reaches at or below a predetermined clamping voltage so as to output said controlled voltage from an output terminal, comprising:

15            one or more switching elements, each having a control electrode that is connected between said input terminal and the output terminal;

a voltage-generating circuit for generating an output voltage  $V_o$  proportional to a voltage between an  
20 input end and an output end of each of said switching elements so as to output the generated voltage; and  
a control circuit for controlling an operation of said switching element depending on the output voltage  $V_o$  of the voltage-generating circuit;

25            wherein the control circuit causes the switching

element to reduce an output current when the output voltage  $V_o$  of the voltage-generating circuit exceeds a predetermined reference voltage  $V_s$ .

- 5           4. A power-supply apparatus for controlling a voltage input to an input terminal such that the voltage reaches at or below a predetermined clamping voltage so as to output said controlled voltage from an output terminal, comprising:
- 10           one or more switching elements, each having a control electrode that is connected between said input terminal and the output terminal;
- a voltage-generating circuit for generating an output voltage  $V_o$  proportional to a voltage between said
- 15 input terminal and said output terminal so as to output the generated voltage; and
- a control circuit for controlling an operation of each of said switching elements depending on the output voltage  $V_o$  of the voltage-generating circuit;
- 20 wherein the control circuit causes the switching element to reduce an output current when the output voltage  $V_o$  of the voltage-generating circuit exceeds a predetermined reference voltage  $V_s$ .

- 25           5. The power-supply apparatus as claimed in

claim 1,

wherein the voltage-generating circuit comprises:  
a first MOS transistor having a source connected to said  
input terminal and a gate connected to said output  
5 terminal; and

a second MOS transistor having a source, a  
drain and a gate that are respectively connected to a  
drain of the first MOS transistor, a ground voltage, and  
a predetermined voltage  $V_{bias}$ ;

10 and wherein said first MOS transistor and said  
second MOS transistor, being of the same type of MOS  
transistor output from a junction of said first MOS  
transistor and second MOS transistor a voltage  $V_o$   
proportional to a voltage between said input terminal and  
15 the output terminal.

6. The power-supply apparatus as claimed in  
claim 5,

wherein said first MOS transistor and said  
20 second MOS transistor have the same electrical  
characteristics.

7. The power-supply apparatus as claimed in  
claim 5,

25 wherein each of said first MOS transistor and

said second MOS transistor is a PMOS transistor.

8. The power-supply apparatus as claimed in claim 5,

5 wherein said proportional voltage  $V_o$  is a voltage having added to a predetermined voltage  $V_{bias}$  a gate-source voltage of the second MOS transistor.

9. The power-supply apparatus as claimed in 10 claim 1,

wherein said control circuit comprises:

a reference-voltage generating circuit for generating a predetermined reference voltage  $V_s$  so as to output the generated voltage; and

15 a comparator circuit for controlling the operation of said switching element such that said proportional output voltage  $V_o$  reaches said reference voltage  $V_s$ .

20 10. The power-supply apparatus as claimed in claim 1,

wherein said switching element, said voltage-generating circuit, and said control circuit are integrated into one integrated circuit.